How Peers and Teachers Shape Elementary School Children's Academic and Socioemotional Development

Frank Vitaro, Hilde Colpin, Jacintha Tieskens, and Pol A. C. van Lier

Introduction

Throughout the elementary school years, children tend to spend more time with their peers and teachers than with their parents. Based on bio-ecological models of development (e.g., Bronfenbrenner & Morris, 2006), these outside-of-the-family experiences ought to contribute, for better or worse, to their socioemotional and academic development. There is, indeed, empirical evidence showing that relations with peers and teachers predict different types of student outcomes. However, limitations in study design often interfere with the proper identification of such influences because not all methodologies (e.g., cross-sectional designs) effectively maintain internal validity and establish directionality of influence. In addition, results across studies may differ because experiences with peers and with teachers may play different roles (e.g., risk/beneficial factors, moderators, or mediators) depending on the specific type of experience at play (e.g., friendship participation vs friends' characteristics) and the different outcomes under scrutiny (e.g., internalizing vs externalizing problems) (Vitaro, Boivin, & Bukowski, 2009a). Results may also differ depending on participants' characteristics (e.g., age, sex, and socio-behavioral profile). Therefore, to best depict a clear picture of the roles that peers and teachers play in children's lives, we adopted a broad scope that includes

F. Vitaro (✉)
School of Psychoeducation, University of Montreal, Montreal, Canada
e-mail: frank.vitaro@umontreal.ca

H. Colpin
School Psychology and Development in Context Research Unit, KU Leuven University, Leuven, Belgium
e-mail: hilde.colpin@kuleuven.be

J. Tieskens · P. A. C. van Lier
Clinical Developmental Psychology, Vrije Universiteit Amsterdam, Amsterdam, Netherlands
e-mail: j.m.tieskens@vu.nl; pac.van.lier@vu.nl

different types of social experiences and different outcomes while limiting the developmental period under scrutiny (i.e., to childhood/elementary school period). More specifically, we focused on two types of peer processes: those at the dyadic level (i.e., friendship participation, friends' characteristics, friendship quality) and those at the group level (i.e., peer rejection/acceptance, peer victimization, peer group norms). Most developmental theorists emphasize the importance of both types of peer experiences as antecedents of multiple forms of behavioral adjustment, including socioemotional development and school engagement (Kindermann, 2016; Sullivan, 1953). We also covered two parallel types of teacher experiences: those at the group level (teacher vis-à-vis the class group, with a focus on management style) and those at the dyadic level (teacher vis-à-vis one student, with a focus on the affective quality of the teacher-child relationship). Together, these two types of teacher experiences cover most of the daily teacher-child interactions in the classroom. In line with our broad perspective, each type of peer and teacher experience was examined (a) in reference to socioemotional outcomes, such as internalizing behaviors (i.e., anxiety, withdrawal, feelings of loneliness, depressive symptoms, well-being), externalizing behaviors (i.e., aggression, opposition, hyperactivity-inattention, antisociality), and prosociality, and (b) in reference to academic outcomes such as school engagement and academic performance. We considered each type of peer and teacher experience as a predictor with a main, mediating, or interactive "effect" in regard to child's functioning in multiple domains. As much as possible, we documented the intra- or interpersonal mechanisms that could account for these different roles. However, we did not document possible reciprocal associations between domains of child functioning and changes in experiences with peers and with teachers, nor did we document factors that could mitigate or exacerbate the contribution of peer and teacher experiences (except for children's sex and age, when available). Finally, we conclude our review with a brief examination of the possible interplay between peers and teachers and a list of questions/issues for the future.

In line with our first point above, we focused on studies with strong internal validity. More specifically, we selected longitudinal studies that included strong control of third variables, studies using an experimental design, and studies using a genetically informed design. In and of itself, well-controlled longitudinal and genetically informed studies cannot provide direct and conclusive proof of causation to the extent that an experimental design can. However, we deemed it necessary to include these two types of non-experimental designs for the following reasons. First, studies using an experimental design are scarce and often limited in the type of experiences that could be manipulated (for ethical and practical reasons). Second, well-controlled longitudinal studies using, for example, a cross-lagged design and genetically informed studies have substantial virtues of their own. More specifically, well-controlled longitudinal studies using a cross-lagged design allow for the control of concurrent and stability links of both the predictors and the outcomes, in addition to the control of third variables. Longitudinal studies also allow researchers to examine the accumulated or differential "effect" of social experiences over several months or years. In contrast, experimental studies are often limited with respect

to the duration of the exposure to the manipulated social experience. In a similar vein, genetically informed studies (i.e., twin studies) identify, but also account for, genetic factors inherent to the child that might be confounded with social experiences through a process known as a gene-environment correlation (rGE) or may interact with specific social experiences through a process known as a gene-environment interaction (GxE) (see Brendgen et al., 2012).

Peer Experiences at the Dyad Level

As suggested by Hartup (1996, 2005), three aspects of friendships were examined in order to more fully understand how and when friendships make a positive or a negative contribution to children's psychosocial and academic development: friendship participation, friends' characteristics, and features of friendships.

Friendship Participation Friendship participation has been typically defined as having at least one mutual friendship with another child (Bukowski & Hoza, 1989; Parker & Asher, 1993). This dichotomous view of friendship participation was derived from the finding that the number of friends is not linearly related to individual adjustment: Whereas children with no mutual friends report more internalizing symptoms than those with one or more mutual friends, those with more than one mutual friend do not differ from those with one mutual friend in that respect (Parker & Seal, 1996).

Several studies have shown that the presence/absence of at least one mutual friend during elementary school is significantly related to later adjustment. However, in accordance with our concern for internal validity, few studies have included the appropriate controls to ensure that the role of friendship participation was not spurious. A first set of variables to control is children's initial social-cognitive, behavioral, or emotional characteristics or states. Children who have friends tend to differ from children without friends on these characteristics (Newcomb & Bagwell, 1995). A second set of variables to control are correlated social experiences: compared to children lacking friends, friended children may also be exposed to a variety of other experiences due to their personal characteristics (e.g., social acceptance at the group level).

Only a few studies have included the above controls in examining the main contribution of friendship participation to child development. In one study, fifth graders who had a stable best friend viewed themselves more positively and reported fewer depressive feelings in early adulthood than those who were friendless (Bagwell et al., 1998). Of note, the benefits of having a friend were found to be specific to emotional well-being; peer acceptance, but not friendship status, predicted school performance. Another study found that the lack of a close friend from grade 1 through grade 3 predicted greater feelings of loneliness and anxious-depressed behaviors 1 year later, above and beyond initial levels of these internalized problems, peer rejection, and peer victimization (Ladd & Troop-Gordon, 2003). Using a

cross-lagged design spanning from early childhood to early adolescence, Pedersen et al. (2007) also found that friendship participation predicted lower levels of loneliness and depressed feelings, even after accounting for personal and social factors such as disruptiveness, anxiety, and peer rejection. Friendship participation also partially mediated the links between these personal and social factors and depressive feelings and loneliness. However, friendship participation did not predict externalized (i.e., delinquent) behaviors. The few studies that included sex as a moderator found that the association between friendship participation and emotional well-being is especially strong for girls in the fifth and eighth grades (e.g., Oldenburg & Kerns, 1997), which could reflect a greater orientation toward, and dependence upon, social relationships in females than in males (Archer & Lloyd, 2002). However, this last finding should be qualified further by age, as these sex differences were not found among young school-age children (e.g., Ladd & Troop-Gordon, 2003).

Having at least one close friend is not only beneficial to a child's well-being; it may also protect against the negative emotional consequences of aversive social experiences (i.e., it may operate as a moderator). For example, unlike classmates who are rejected by the peer group and have no friends, school children who are rejected but who have at least one mutual friend do not report greater levels of loneliness and depression when compared to their more accepted peers (Parker & Asher, 1993). This protective effect of friendship participation in reference to peer rejection is already operative during the early school years (Laursen et al., 2007). Having at least one close friend also protects children against the continuation of peer victimization and its negative consequences. For example, a study of fourth and fifth graders who were victimized revealed that having a reciprocal best friend significantly reduced the likelihood of being re-victimized over a 1-year period (Hodges et al., 1999). It also reduced the likelihood of developing internalizing problems compared to those without a best friend. Having a best friend present during a difficult event also appears to reduce stress, as measured by the hormone cortisol (Adams et al., 2011). Similarly, possessing high-quality friendships offers protection against anxiety disorders for victims of serious abuse, such as childhood sexual abuse (Adams & Bukowski, 2007). Finally, there is evidence from genetically informed studies that friendship participation can reduce the expression of a genetic vulnerability for depression in girls (i.e., it operates as a moderator relative to genetic risk). For boys, friendship participation (and genetic vulnerability) appears to be directly related (i.e., via main effects) to depressive symptoms (Brendgen et al., 2013a).

Many processes could underlie the longitudinal association between participation in friendship and later emotional well-being. For instance, friendship participation may provide children with a "secure base" necessary to create comfort and willingness to explore new environments and get involved in new social situations (Birch & Ladd, 1996). The absence of such a secure base, in turn, can generate anxiety and lack of self-confidence. It may also negatively affect children's self-perceptions, which are central to emotional well-being and self-confidence (Ladd & Troop-Gordon, 2003). Friended children may also be less at risk for feelings of

distress than solitary individuals because friends provide important social provisions such as companionship, emotional support, intimacy, and self-validation (Boivin et al., 2001). In sum, friendship participation seems to play a beneficial or protective role regarding internalizing behaviors and well-being through a number of possible processes, but does it play similar roles with respect to school achievement and externalizing behaviors?

Several short-term longitudinal studies reveal that school children who have a reciprocated friendship by the end of elementary school manifest increased levels of school liking and prosocial behavior (Erath et al., 2008; Wentzel et al., 2004). Friendships may provide motivational and instrumental support to engage and succeed in school-related activities (Erath et al., 2008) and for behaving prosocially (Wentzel et al., 2004). However, as noted earlier, friendship participation per se does not seem to affect academic performance directly (Bagwell et al., 1998). The evidence of a beneficial effect of friendship participation with respect to externalizing behaviors is also mixed. To illustrate, Laursen and colleagues found that first grade children with at least one mutual friend experienced a decrease in both internalizing *and* externalizing problems over a 1-year period compared to children without a friend (Laursen et al., 2007). In contrast, Vitaro and collaborators found that disruptive boys with at least one mutual friend remained disruptive over a 1-year period compared to disruptive boys with no friends (Vitaro et al., 1997). One possible way to reconcile these contradictory findings is to consider the characteristics of the friends involved in these friendships.

Friends' Characteristics Friendship participation can be beneficial or protective if the friends are well adjusted. For example, evidence from longitudinal data show that affiliation with prosocial friends is related to an increase in children's prosocial behavior and can also reduce children's risk of having problematic relations with other peers (Barry & Wentzel, 2006; Eivers et al., 2012; Wentzel et al., 2004). However, friendships can be detrimental if the friends are deviant. There is indeed strong evidence to suggest that friends' externalizing problems (e.g., antisociality, aggression) predict the maintenance and the escalation of similar externalized behavior problems during the elementary school years. To illustrate, using a cross-lagged design, Buil and her collaborators showed that friends' antisocial behavior from age 8 through age 13 positively predicted overt (i.e., aggression) and covert (i.e., vandalism and theft) antisocial behavior during adolescence, net of the children's personal dispositions (i.e., temperament and antisocial behavior) and of their social status at the group level (i.e., poor social preference) (Buil et al., 2017). Results from other studies suggest that the negative consequences of exposure to deviant friends may be apparent as early as young childhood. For example, Snyder and his collaborators demonstrated that the affiliation with deviant peers in kindergarten predicts growth in overt conduct problems (e.g., aggressiveness) as well as covert conduct problems (e.g., lying and stealing) during the following 2 years (Snyder et al., 2005). It is important to note, however, that the "influence" of friends' externalized problems at this young age may be very specific. To illustrate, Lamarche et al. (2007) found that friends' reactive aggression specifically predicted increases

in participants' reactive aggression, whereas friends' proactive aggression specifically predicted increases in participants' proactive aggression from kindergarten to grade 1, but not the other way around (reactive aggression refers to aggressive outburst following threats or insults, whereas proactive aggression corresponds to aggressive acts manifested without provocation for personal gain).

The available evidence about the developmental role of friends' characteristics rests mainly on correlational, but albeit longitudinal, studies that did not control for possible third variables such as family and genetic factors, forcing the use of cautionary brackets when using causal terms such as friends' "influence." Indeed, there is evidence showing that socio-family and genetic factors may affect social experiences, not only behavior, and thus operate as third unaccounted common factors; for genetic factors, the processes at play are known as gene-environment correlations, or rGE (see Brendgen et al., 2012). Fortunately, the application of methodological strategies such as the monozygotic (MZ) twin-difference method allows one to control for likely genetic and family-wide influences. Since MZ twins from the same pair not only share 100% of their genes but also share the same socio-familial environment when raised together, any behavioral differences between them are attributed to nonshared environmental influences (see Vitaro, Brendgen, & Arseneault, 2009b, for a full description of the method). When adapted to investigations regarding the influence of friends' characteristics (or other social experiences) on child behaviors, this method bolsters confidence that identified associations are not spurious due to genetic and environmental overlap. As an example, Vitaro et al. (2011) found that MZ-twin within-pair differences in friends' physical aggression at age 6 years predicted an increase in MZ-twin within-pair differences in physical aggression from age 6 to 7 years (Vitaro et al., 2011). Using a similar design and similar measures, the same group of researchers did not find however a link between MZ-twin within-pair differences in friends' physical aggression at age 10 and MZ-twin within-pair differences in twins' physical aggression at age 13, possibly because of the more important role played by rGE during late childhood compared to early childhood (Vitaro et al., 2016).

Friends' characteristics may also moderate genetic influences on the expression of children's problem behaviors during the elementary school years. For example, several genetically informed studies demonstrate that an individual's genetic liability toward externalized problems may be expressed more or less strongly as a function of affiliating with aggressive peers (i.e., an example of a gene-environment interaction, or GxE). For example, 6-year-old children enrolled in kindergarten displayed higher levels of aggression if they were at high genetic risk for such behavior *and* were also exposed to highly aggressive friends (van Lier et al., 2007). A follow-up study in first grade revealed that this same gene-by-environment interaction held for physical aggression, but not for social aggression (Brendgen et al. 2008a).

Researchers have proposed several explanatory mechanisms at the interpersonal level to account for the main or moderating effects of friends' "negative" characteristics on children's problematic behaviors. A first process, labeled *deviancy training*, has received substantial empirical support. Specifically, deviant friends tend to

reinforce (through laughter or positive nonverbal feedback) rule-breaking talk or deviant acts and tend to ignore or punish normative behaviors (Dishion et al., 1996). Deviancy training may occur among kindergarten children; in one study, engaging in deviant talk and imitative play of deviant behaviors with same-gender peers predicted an increase in overt and covert conduct problems on the playground, at school, and at home (Snyder et al., 2005). A second process that may facilitate deviancy training in the context of friendships is *pressure to conform to norm-breaking (or norm-obedience) behaviors*. For example, when compared to non-aggressive boys and their friends, 10-year-old aggressive boys and their friends tend to provide more enticement for rule violations in situations that provided opportunities for rule-breaking behavior (Bagwell & Coie, 2004). *Demonstration-imitation through observational learning* of rule-breaking or aggressive behaviors is a third process that may also explain how friends support the acquisition, maintenance, or escalation of aggressive-antisocial behavior (Berndt, 1999; Hartup & Stevens, 1997). As shown by Thompson et al. (2019), all the above processes can simultaneously and independently play a role. More specifically, these authors found reciprocal relations between peers' problem behavior, peer pressure for fighting, and peers' support for fighting and changes in self-reported aggressive behavior from age 10 through age 16. The positive counterparts of these processes (i.e., conformity training, motivation to conform to prosocial norms through feelings of retribution, or demonstration-imitation) can also explain how friends' prosocial behavior by late childhood predicts change in individuals' prosocial behavior (Wentzel et al., 2004).

Antisocial children tend to be bossier with their friends and are often more frequently involved in coercive and conflictual exchanges than conventional children (Deptula & Cohen, 2004). These conflictual-negative interactions could set in motion a *coercive interactional process* (Boivin & Vitaro, 1995) whereby coercing or threatening one's friend for some personal benefit, if successful, can increase the likelihood of similar coercive behaviors in the future through negative reinforcement. Consistent with this notion, coercion from a best friend accounted for the link between friends' aggression and an increase in participants' aggression in young boys (Vitaro et al., 2011). Importantly, it is possible that different processes underlie friends' "influence" depending on the type of outcome at stake. For example, there is evidence showing that coercion is involved with aggression-type outcomes, whereas deviancy training and modeling foster externalizing problems of the covert type such as stealing and cheating (Snyder et al., 2007). Coercion from an aggressive friend can also affect children's depressive mood (Vitaro et al., 2011).

However, friends do not need to be aggressive or deviant to affect children's mood or internal feelings. There is accumulating evidence that friends' internalizing problems can foster children's internalizing problems such as anxiety and depressive feelings, especially among girls (Prinstein, 2007; Stevens & Prinstein, 2005). Negative affect can spread between friends through co-rumination, a form of disclosure that involves rehashing and excessively discussing problems, mutual encouragement of problem talk, and dwelling on negative affect (Rose, 2002). The vast majority of studies examining this topic included adolescents. There is one study, however, that found that co-rumination among friends in late childhood predicts

increased internalizing problems, specifically anxiety, while accounting for possible rGE through the use of the MZ-twin difference method (Dirghangi et al., 2015).

By increasing children's externalized or internalized problems, friends' externalized or internalized behavior can ultimately, albeit indirectly, negatively influence children's academic success or school motivation. Such indirect effects of friends' characteristics regarding school-related outcomes lack empirical evidence at this moment. However, there is evidence that friends' academic behavior can directly influence children's academic achievement. For example, Nelson and DeBacker (2008) found that having a best friend who values academics positively contributes to children's adaptive achievement motivation. Similarly, Kindermann and Skinner (2012) found that the engagement levels of friends predicted changes in children's classroom engagement, independent of levels of engagement of the rest of classmates (which also made a significant contribution). Conversely, students who associate with friends who reject school are more likely to perform poorly academically (Véronneau et al., 2008) and more likely to drop out of school (Fergusson et al., 1999). However, when controlling for both current peer acceptance at the group level and autoregressive effects through the use of a cross-lagged design from grade 2 to grade 7, Véronneau and her colleagues did not find a predictive link between friends' academic achievement and changes in participants' academic achievement. Only peer rejection at the group level predicted decreases in academic achievement from grades 3 through 5 (Véronneau et al., 2010). In sum, the role friends play with respect to children's academic achievement by virtue of their personal characteristics is yet unsettled. This might be because the role of friends' characteristics may depend on the quality of the friendship.

Friendship Quality Unfortunately, studies examining friendship quality as a moderator of the link between friends' characteristics and changes in children's behavior or academic performance are scarce; they are also inconclusive. To illustrate, in one study, high friendship quality (i.e., caring, sharing, helping, laughing) mitigated the link between friends' aggression and changes in young children's aggression (Salvas et al., 2011). Yet, in other studies involving young adolescents, high friendship quality exacerbated deviant friends' "influence" on young adolescents' externalizing behaviors (Piehler & Dishion, 2007). Finally, in a third study, it was low- (i.e., conflict, betrayal, coercion), not high-, quality friendship that exacerbated the risk associated with exposure to deviant or depressed friends (Poulin et al., 1999; Prinstein, 2007).

The evidence regarding the main effect of friendship quality in regard to children's socioemotional development is more consistent. To illustrate, a child's involvement in an intimate, trustworthy, caring, and supportive friendship positively predicts his/her well-being and prosocial behavior (e.g., Betts & Rotenberg, 2007; Ladd et al., 1996). High-quality friendships frequently serve as emotional and cognitive resources that help children adapt to stress and more successfully cope with social demands and interactions with classmates (Baker & Hudson, 2013). There is

also evidence that measures of friendship quality that aggregate such features as cooperation, help, and conflict are related to a decrease in young children's aggression, even after accounting for initial levels of friends' and children's aggressive behaviors (Engle et al., 2011; Salvas et al., 2011). Conversely, low-quality friendships that are high in negative features such as conflict or rivalry are linked to an overall negative style of interaction that promotes disruptive behavior and poor adjustment (Engle et al., 2011; Ladd et al., 1996), unless the children involved in these conflicts have the skills to resolve them in an adaptive manner (Salvas et al., 2014; Salvas et al., 2016).

Maintaining a positive relationship with a friend may directly contribute to improved school engagement and academic competence in children, independent of experiences at the group level (Erath et al., 2008; Ladd et al., 1996). More specifically, positive friendships likely encourage children to remain motivated in school and may facilitate competent completion of academic work via shared study sessions, both of which promote school performance (Wentzel, 2009; Wentzel & Muenks, 2016). However, negative features of friendship quality may matter more than the positive features as shown by Sebanc et al. (2016). Across three time-points in the transition from elementary to early middle school, these authors found consistent bidirectional contributions to and from academic achievement but only with negative friendship quality: academic achievement negatively predicted negative friendship quality, which in turn negatively predicted academic achievement. In contrast, Vitaro and his colleagues found no contribution of best friend's relationship quality to child academic performance from kindergarten to grade 1. Importantly, this study controlled for possible genetic and shared environmental influences through the use of the MZ-twin difference method, as well as other social experiences such as relationship quality with the larger peer group (i.e., rejection and victimization), relationship quality with the teacher, and parental hostility-coercion (Vitaro et al., 2012).

In sum, features of friendship such as conflict resolution or prosocial behaviors practiced among friends may impact children's behavior directly or help explain the main effect of friendship participation or friends' behavior (i.e., operate as mediators). Other features of friendships such as the provision of companionship and social support (Birch & Ladd, 1996), or the provision of instrumental assistance and feelings of security (Wentzel, 1996), may help explain how friendship participation can impact children's emotional development. Together, these features of friendship can also impact school engagement and academic performance, although evidence of such notions is currently inconclusive. The evidence in support of a moderating role of friendship quality with respect to the contribution of friends' characteristics, notably aggression, on such outcomes is also inconclusive. In contrast, the literature showing a moderating (i.e., buffering) role of friendship quality on the stability of personal dispositions toward anxiety (Baker & Hudson, 2013) or with respect to the psychosocial correlates often associated with anxiety, such as loneliness feelings and low self-efficacy, are more consistent (Erath et al., 2010).

Peer Processes at the Group Level

A second field of research on the influence of peers on children's socioemotional and academic developmental outcomes is focused on experiences within the larger peer group, such as the classroom. With the transition to elementary school, children move into classrooms with 20–30 age-matched peers, with whom they need to function for a significant time during the day. The resulting social interactions between peers within a classroom may result in children developing appreciation for specific classmates, which may result in dyadic friendships (as discussed above). However, apart from dyadic appreciation, these group interactions may also result in evaluations of each child as well as of social behaviors in general by the group or classroom. In the following section, we will discuss two different peer processes within the larger peer group that may contribute to socioemotional and academic development in elementary school children. The first process refers to the evaluation or appreciation of individual children by the classroom peers. This evaluation may result in different degrees of social preference, or social status, of children in the classroom, with some being liked and others disliked by their classroom peers. In light of this, we will also discuss peer victimization as one of the processes associated with being disliked by classroom peers. The second process is the evaluation or appreciation of behaviors in the classroom, which we call peer social norms. This may refer to the presence of unwritten rules or norms about what behavior the classroom as a whole sees as appropriate or normative.

Peer Evaluation of Individual Children Within the Classroom Whenever children are placed in a group, or classroom, children within this classroom will start to evaluate their classmates. As a consequence of this evaluation process, children receive a "social status" within their classroom (Coie et al., 1982). That is, some children become well liked and accepted/prefered by their classmates, whereas others become disliked and rejected by their classmates. Especially a negative appreciation by peers may emerge swiftly. In their pioneering work on peer social status, Coie and Kupersmidt (1983) placed boys who were unacquainted with each other into laboratory playgroups and compared their emerging peer status in this new peer group with the status children had in their classroom. They found that within three play sessions, children who were rejected in their classroom also developed a rejected status among their new, previously unacquainted playgroup peers. A study by Gooren et al. (2011) among kindergartners confirmed that already in kindergarten some children develop a poor social status among peers, which becomes stable thereafter. Other studies covering longer developmental spans confirm that the poor social status that a child develops in kindergarten likely translates into a stable poor social position in early elementary school (van Lier & Koot, 2010) and across the elementary school years (Ladd, 2006).

Peer victimization is defined as being the recipient of repeated aggression in which one or more bullies intend to harm or disturb another person physically, verbally, or psychologically/relationally (Boulton & Underwood, 1992; Nansel et al.,

2001; Olweus, 1978; Wolke et al., 2001). Although peer victimization does not necessarily follow from poor peer appreciation, some parallels between peer rejection and peer victimization have been observed. Like peer rejection, peer victimization may emerge swiftly in elementary school and tends to become stable (van Lier et al., 2012; Pouwels et al., 2016). Importantly, crosslinks between peer social status and peer victimization have been found in that rejected children become victims of bullying, while victimized children in turn become progressively more rejected by peers (Ladd & Troop-Gordon, 2003; van Lier & Koot, 2010). As such, peer rejection may be considered a more passive evaluative process that is not necessarily expressed directly, whereas peer victimization is the behavioral enactment of rejection toward the child by at least some members of the larger peer group.

Peer Evaluation of Behaviors Within the Classroom Another peer process at the larger group level that has received considerable attention concerns the role of peer social norms for children's socioemotional and academic development (Henry et al., 2000). Peer social norms can be seen as unwritten rules within a group about what behavior seems appropriate within that group as a whole. Peer social norms derive from group consensus about what is appropriate behavior; thus, norms are shared within a group setting. Different forms of peer social norms have been described (Veenstra et al., 2018). Descriptive norms reflect what kind of behavior is most prevalent in a given group. Injunctive norms reflect what is considered appropriate in the group by asking group members to express their attitudes toward a behavior and aggregating all responses into one single attitude score that reflects the injunctive norm of the group. Norm salience captures the degree to which a behavioral norm is made salient or explicit to group members, e.g., via social rewards or sanctions. Norm salience is generally measured by the within-group correlation between behavior and social status (e.g., social acceptance, popularity or social rejection).

Impact of Peer Processes at the Group Level on Children's Socioemotional and Academic Development Many studies have documented the association of peer processes in the larger group with socioemotional development (Deater-Deckard, 2001; Hawker & Boulton, 2000; Parker et al., 2015; Rubin et al., 2006; Takizawa et al., 2014) as well as with academic development (Nakamoto & Schwartz, 2010; Véronneau et al., 2010; Vitaro et al., 2012). In line with our methodological guidelines, we highlight some studies using designs that enable studying direction of effects. The study of direction of effects seems important as one of the main reasons why children may develop poor relations with their peers is their own behavioral difficulties (Coie & Kupersmidt, 1983; Dodge, 1983; Teräsahjo & Salmivalli, 2003).

A number of longitudinal cross-lagged studies, which collectively cover the kindergarten and elementary school period, found that experiences of peer rejection predict increases in externalizing problems over and above existing problems (Ladd, 2006; Leflot et al., 2011; Sturaro et al., 2011; van Lier & Koot, 2010). Similar to peer rejection, peer victimization experiences were found to predict increases in externalizing problems even when reverse paths, from externalizing problems to victimization, were accounted for (Reijntjes et al., 2011; van Lier et al., 2012). The

same results apply to internalizing outcomes with respect to peer rejection (Ladd, 2006; van Lier & Koot, 2010) and victimization (Reijntjes et al., 2010; van Lier et al., 2012). Longitudinal associations of peer rejection and victimization with problematic academic functioning have also been reported (Schwartz et al., 2005; Vaillancourt et al., 2013a).

In the last decades, interest grew in the effects of peer social norms on individual behavioral development and academic achievement. Before describing the relevant studies, however, it is important to note that individual children's behaviors affect peer social norms, especially descriptive peer social norms. Indeed, descriptive peer social norms are derived from the cumulative behaviors prevalent in a classroom and are therefore directly influenced by behaviors of individual classmates. However, studies have also shown that peer social norms in turn may influence individual behavioral development. For instance, Henry et al. (2000) showed that in classrooms where peer social norms against aggression were made salient (i.e., classrooms where aggressive behavior was not appreciated), aggressive behavior of individual students diminished over time. Other studies reported predictive effects of classroom peer norms on the development of social withdrawn behavior (Guimond et al., 2018), the socialization of aggressive behavior (Correia et al., 2019), the development of risk-taking behavior (Tieskens et al., 2019), and academic development (Chen et al., 2003) in elementary school children. Thus, similar to what is shown regarding other peer processes at the group level, such as social preference and victimization, the link between peer social norms and behavior development is likely bidirectional.

Given the impact of these peer processes at the group level on children's healthy psychosocial and academic development, numerous studies have been aimed at trying to understand the processes through which peer group processes may lead to problematic socioemotional and academic development.

Processes Through Which Peer Influences at the Group Level May Affect Socioemotional and Academic Development

A first notion that needs to be considered when trying to understand how peer processes at the group level may be associated with individual children's outcomes is the role of *cascading* experiences over the elementary school years. For instance, we previously showed that experiences of peer rejection relates to experiences of victimization in a transactional manner. That is, peer rejection may evoke experiences of victimization, with victimization in turn leading to further rejection of the child by the peer group (Teräsahjo & Salmivalli, 2003; van Lier & Koot, 2010). But this process may not stop there. Poorly appreciated children have increasing difficulties in forming friendships in the classroom (Salmivalli & Isaacs, 2005; van Lier & Koot, 2010). It is, however, not correct to assume that rejected children do not form friendships. As shown by Vitaro et al. (2007), while early elementary school

disruptiveness predicts peer rejection, experiences of peer rejection among disruptive children in turn predict a drift toward forming relationships with (similarly) disruptive friends. Thus, disruptive peer-rejected children may develop friendships, but with peers who may help them refrain from disruptive behavior. In fact, affiliation with disruptive friends has been found to predict engagement in adolescent delinquency (see also Mehus et al., 2018). In another longitudinal study among elementary school children assessed from grade 3 to grade 8, it was shown that peer victimization, internalizing and externalizing symptoms, as well as academic functioning covary and interact with one another across the elementary school period and beyond (Vaillancourt et al., 2013b). Also in a study by van Lier et al. (2012), it was shown that externalizing problems predict academic underachievement and peer victimization, which in turn predict increases in internalizing and externalizing problems.

Children who are poorly appreciated by their peers may also encounter difficulties in the relationship with their teachers. As the authority figure in the classroom, teachers may have a unique role in building satisfying and safe "attachment" relations with children (Pianta & Stuhlman, 2004). Unfortunately, rejection by classmates has been found to also predict decreases in perceived support by teachers (Leflot et al., 2011), as well as rejection by teachers (Mercer & DeRosier, 2008). However, this does not necessarily mean that teachers develop negative relations with all rejected children and automatically become "part of the problem." To illustrate, in a longitudinal study, it was found that peer rejection predicted increases in internalizing problems via a reduction in positive self-concept (Spilt et al., 2014). However, this pathway was moderated by teacher support. Specifically, when teacher support was low, the pathway of rejection to internalizing problems via low self-concept was significant. In contrast, at high levels of teacher support, rejection was no longer associated with poor self-concept and subsequent internalizing problems (more on teacher support and teacher-child experiences in the next section).

Another important line of research has focused on the role of *distorted self-regulation and social cognition* as a possible link between peer influences and maladjustment. Healthy peer relations provide a context in which children learn to regulate their emotions and behaviors and to manage conflict (Asher & Rose, 1997; Bukowski, 2003; Hartup & Stevens, 1997). In addition, during interactions with peers, children learn to encode and interpret social situations, to decide on goals they want to achieve, to construct and evaluate their planned response, and to enact the desired behavior (Crick & Dodge, 1994). Peer rejection and victimization may hamper these developmental processes and distort children's interpretation of peer's intentions and hamper control processes to manage their impulses. As a result, rejected and victimized children may become more likely to engage in automatic and reflexive rather than effortful and reflective cognitive, emotional, and behavioral reactions to their environment (Schwartz, 2000). As Williams (2007) puts it, rejection or victimization "impairs individuals' ability to self-regulate, which inhibits their ability to utilize the cognitive/motivational resources that are necessary to avoid impulsive acts and to engage in hedonic sacrifice and delayed gratification" (p. 432).

In line with this notion, several studies found associations between poor social experiences with peers in elementary school and distorted social information patterns (Camodeca & Goossens, 2005) as well as maladaptive social cognitions (Rudolph et al., 2009). Associations were also found between poor peer experiences and problems with self-regulation among children (Stenseng et al., 2015; Trentacosta & Shaw, 2009). Moreover, studies found that the predictive link between peer rejection and aggression in elementary school was mediated by distorted social information processing patterns (Dodge et al., 2003; Lansford et al., 2010). In fact, the study by Lansford et al. (2010) suggested a vicious cycle between experiences of rejection, social cognitions, and aggression, such that experiences of rejection predicted distorted social cognitions, which then predicted both aggressive responses and more experiences of peer rejection. This cycle repeated itself throughout the studied period of kindergarten to third grade. In addition, it has been shown that peer social norms may interact with experiences of victimization in the development of risk-taking behavior (which is related to poor self-regulation) (Tieskens et al., 2019). Specifically, victimized children tended to show increases in risk-taking behavior only in those classrooms where the classroom norm was unfavorable toward risk-taking. This study shows that, to understand the relation between individual social experiences and behavioral development, it is important to consider the broader social context such as peer social norms.

Another set of processes that could help explain the link between negative social peer experiences and maladjustment involves *biological mechanisms*. There is growing evidence that experiences of peer rejection or peer victimization may get "under the skin" of elementary school children. Although these biological correlates may not directly explain the maladaptive outcomes found among rejected and victimized children (Deater-Deckard, 2001; Hawker & Boulton, 2000; Parker et al., 2015; Rubin et al., 2006; Takizawa et al., 2014), they may help us understand the possible pathway toward these outcomes. These biological correlates of peer rejection/victimization encompass (epi)genetic processes, stress system responses, and brain responses (see, for instance, Vaillancourt et al., 2013b). Each of these will be outlined in more detail in Chap. 4 (epigenetics), Chap. 5 (stress system), and Chap. 7 (brain responses) of this volume. However, a short overview is presented below.

Earlier in this chapter, basic principles of gene-environment interplay in peer relations were discussed with regard to friendships. These principles may also apply to peer influences at the larger group level (see also Chap. 3, this volume). For example, Brendgen et al. (2009) showed that a child's genetic risk for depression may increase the likelihood of being rejected by peers. This is an example of a gene-environment correlation (rGE). Gene-environment interactions (GxE) have also been reported with regard to peer influences at the larger group level. To illustrate, Brendgen et al. (2008a, b) showed that the link between victimization and aggression was stronger in girls with a genetic liability toward aggression compared to girls without such liability. Such GxE effects have also been found with respect to classroom norms. Specifically, children with a genetic disposition for aggressive behavior had an increased risk of being victimized by their peers, but only in classrooms where norms were unfavorable toward aggression. However, in classrooms

where norms were favorable toward aggression, a genetic disposition for aggression protected the children against peer victimization (Brendgen et al., 2015). Interestingly, classroom norms may also moderate the expression of genetic liability for aggressive and non aggressive antisocial behavior in early and middle childhood (Brendgen et al., 2013b; Vitaro et al., 2015).

One specific mechanism underlying gene-environment interaction may be DNA methylation. DNA methylation is an *epigenetic process* that maintains gene activity or changes gene expression by activating or silencing the gene. Epigenetic alterations seem to function as a "biological mechanism for translating environmental signals into organismal molecular events" (Bick et al., 2012, p. 1418). Recently, it has been shown that childhood maltreatment, including exposure to peer victimization, may influence DNA methylation (Cecil et al., 2020; Mulder et al., 2020; Ouellet-Morin et al., 2013). For instance, Ouellet-Morin et al. (2013) studied DNA methylation in 28 MZ-twin pairs discordant for peer victimization experiences in elementary school. Both groups exhibited similar DNA methylation patterns prior to peer victimization, at 5 years of age. However, compared to their non-victim co-twins, twins who experienced peer victimization in elementary school had, on average, higher levels of DNA methylation at 10 years of age. Moreover, the higher levels of DNA methylation were correlated with lower cortisol responses to a stress task, 2 years later (at age 12 years) among the bullied twins, compared to their non-bullied co-twin. Importantly, "blunted" cortisol responses have been implicated with social and behavioral difficulties among children (Ouellet-Morin et al. 2011).

The human stress system is comprised of the autonomic nervous system (ANS) and the hypothalamic-pituitary-adrenal axis (HPA axis). Heart rate and heart rate variability are used as a proxy to measure activity of the ANS system. The primary end product of the HPA axis in humans is cortisol, which is a common measure of the activity of the HPA axis. Both hyper- and hypoactivation of the *stress system* have been linked with psychopathology outcomes (Beauchaine et al., 2007; El-Sheikh et al., 2001; Flynn & Rudolph, 2007; McLaughlin et al., 2015). Studies focusing on the associations between peer rejection or peer victimization and heart rate variability among elementary school children are rare. However, one study found that relational victimization in the classroom predicted decreased heart rate variability in 6–10-year-old children (Michels et al., 2013). Importantly, decreased heart rate variability in children has been associated with (sub)clinical levels of internalizing symptom (Dieleman et al., 2015; Hastings et al., 2008; Monk et al., 2001). There is also evidence that overall higher levels of cortisol across the day are associated with poor appreciation by classroom peers (Behnsen et al., 2018). Similarly, peer rejection has been associated with higher levels of cortisol at school, especially among children with few friends (Peters et al., 2011).

Advances in neuroscience have resulted in several studies on the association between elementary school children's peer experiences and *brain responses*. Studies on the normative neural responses to social stressors among elementary school children found that experiences of social exclusion may be processed in the brain in a similar way as physical pain (Achterberg et al., 2018; van der Meulen et al., 2017; van der Meulen et al., 2018). Other studies compared children with a history of poor

classroom peer acceptance to children with a history of positive peer acceptance. The results suggest different neural activation between these two groups of children. To illustrate, in a study by Asscheman et al. (2019), children with a history of rejection were found to show higher activity during social exclusion in brain regions implicated in social cognition and emotion regulation.

To summarize, peer processes at the group level, such as social acceptance, peer rejection and victimization, and peer social norms, have been related to problematic socioemotional and academic development in children, which most likely happens in a bidirectional way. Different pathways of how peer processes may be linked to problematic socioemotional and academic development have been proposed. Firstly, developmental cascades may arise, where problems in one social domain may reinforce problems in another social domain, eventually leading to problematic behavioral development in children. Secondly, problems with self-regulation and social cognitions may mediate the link between peer processes at the group level and childhood behavioral development. Experiences at the peer group level may become embedded in the biology of the child. Biological processes such as differential epigenetic profiles, dysregulated stress system, and hyper- or hypoactivity in brain regions implicated in social cognition and emotion regulation have been found to link peer processes at the group level and problematic socioemotional and academic development. Finally, processes already described in reference to deviancy training and modeling might also help understand how social norms may influence children's behavior.

Teacher-Child Experiences at the Dyadic Level

Next to peers, teachers are important social partners who can play a key role in children's behavioral and academic development. The importance of dyadic teacher-child relationships has been emphasized by different theoretical perspectives, such as motivational models, social support models, and attachment theory (e.g., Roorda et al., 2011; Spilt et al., 2019; Verschueren, 2015). For instance, self-determination theory (Deci & Ryan, 2000) considers the need to belong as a basic human need and the fulfilment of this need as a condition for learning and well-being. Positive and caring relationships with significant others can play an important role in the accomplishment of the need for belonging. This is in line with the general benefits model for social support, assuming that supportive relationships promote children's socioemotional adjustment through strengthening their positive affect, self-worth, feelings of acceptance, and efficacy beliefs (Cohen & Wills, 1985; Rueger et al., 2016). Attachment theory is another relevant framework in this context (e.g., Pianta et al., 2003). Inspired by parent-child relationship literature, it is argued that teachers can play a role as temporary or ad hoc attachment figures and that the affective quality of the relationship can make a difference for child development (e.g., Pianta et al., 2003; Verschueren & Koomen, 2012). Indeed, studies have shown that children can use their teacher as a "safe haven" to rely on for support and security in times of

stress and as a "secure base" from which to explore the environment (e.g., Koomen & Hoeksma, 2003). In studies based on attachment theory, teacher-child relationships are often conceptualized along positive and negative affective dimensions, labelled as closeness, conflict, and dependency, respectively (Pianta, 2001). *Closeness* refers to the degree of warmth and openness of communication between child and teacher and the child using the teacher as a safe haven in times of stress. *Conflict* is concerned with the degree of discordant interactions between child and teacher. *Dependency* refers to age-inappropriate child dependency to the teacher (expressed in clingy behavior, e.g.) and the failure to use the teacher as a secure base (Pianta, 2001; Verschueren & Koomen, 2012).

Most research regarding the role of affective teacher-child relationships for students' adjustment has focused on preschoolers, or children transitioning from preschool to elementary school. Longitudinal studies in elementary school, especially in the later years, are scarcer (Pakarinen et al., 2018; Verschueren, 2015). Some authors (e.g., Verschueren, 2015) have argued that the role of teachers as a safe haven may become less prominent in middle and late childhood and that it shifts from proximity (in early childhood) to availability later on. However, these authors also emphasized the continued importance of teachers as a secure base from which to explore and the likely continued importance of teachers' safe haven function for vulnerable children (Pakarinen et al., 2018; Rucinski et al., 2018; Verschueren, 2015). The available evidence largely supports these assumptions, as summarized below.

Closeness/Support and Conflict Most research has focused on closeness or support as indicators of positive teacher-student relationships and on conflict as an indicator of negative relationships, whereas dependency has received less attention (but see further). A meta-analysis of 52 longitudinal studies demonstrated that both positive (i.e., close, supportive) and negative (i.e., conflicted) teacher-student relationships uniquely predicted later academic adjustment, i.e., student engagement and achievement, in both primary school (covering preschool, kindergarten, and elementary school) and secondary school (Roorda et al., 2017). Taking a closer look at single studies in elementary school, close and non-conflicted relationships have been shown to predict academic adjustment over time even when controlling for a large number of child characteristics and contextual characteristics (Maldonado-Carreño & Votruba-Drzal, 2011; O'Connor & McCartney, 2007; Spilt et al., 2012a).

For socioemotional outcomes, a number of studies demonstrated that teacher-student *conflict* predicts externalizing behavior within and across elementary school years (e.g., Buyse et al., 2009; Ettekal & Shi, 2020; Rucinski et al., 2018). For instance, Buyse et al. (2009) found that higher teacher-student conflict in first grade predicted higher levels of aggression in third grade, when controlling for a range of child and context variables. Just like studies in preschool (e.g., Doumen et al., 2008; Roorda et al., 2014), Ly and Zhou (2018) found that teacher-student conflict predicted externalizing behavior when using cross-lagged panel modelling controlling for the reverse effect, i.e., of behavior on conflict. However, two other studies in elementary school, one with an early elementary sample (Skalická et al., 2015) and

the other with a late elementary school sample (Pakarinen et al., 2018), only found effects of students' externalizing behavior on conflict with the teacher. It is possible that, by elementary school, students' externalizing behavior and/or their behavioral reputation become more stable and thus less likely to be influenced by teachers. Although further discussion is beyond the scope of this section, these findings illustrate the importance of carefully controlling for potentially confounding effects in longitudinal research, and future research including both effects, i.e., of teacher-student relationships on externalizing behavior and vice versa, is needed. Findings regarding the effect of conflict on internalizing behavior are mixed: a recent study in grades 3–5 found conflict to positively predict these problems over time (e.g., Rucinski et al., 2018), while other studies comprising either younger or older elementary students did not (e.g., Ly & Zhou, 2018; O'Connor et al., 2012; Pakarinen et al., 2018). As for the effects of *closeness/support*, Maldonado-Carreño and Votruba-Drzal (2011) found that increases in teacher-student relationship quality were associated with reductions in internalizing and externalizing student behavior throughout elementary school. In addition, a recent study by Ettekal and Shi (2020) using a person-centered approach demonstrated that low teacher-student warmth in grade 1 co-occurred with more conduct problems which persisted over time until grade 12. Other longitudinal studies, however, have not found consistent evidence for main effects of *closeness* in elementary school. Although a meta-analysis of mainly cross-sectional studies demonstrated that more positive teacher-student relationships were associated with less externalizing child behavior (Lei et al., 2016), several longitudinal studies did not find closeness to predict less externalizing behavior over time in early or late elementary school (Buyse et al., 2009; Ly & Zhou, 2018; O'Connor et al., 2012; Pakarinen et al., 2018; Rucinski et al., 2018). Regarding internalizing behavior, a cross-lagged study by Spilt et al. (2019) found that a supportive teacher-student relationship predicted lower depressive symptoms across grades 2 and 3, but neither Ly and Zhou (2016) nor Rucinski et al. (2018) found a similar effect. Some of these findings are in line with Verschueren's (2015) assumption that, in general, the safe haven function of the teacher may become somewhat less prominent in middle childhood. However, in line with Verschueren's hypothesizing, there is considerable evidence regarding the moderating role of closeness for children at risk, which will be discussed later

As mentioned earlier, research regarding the role of *dependency* as a teacher-student relationship dimension is scarce. A recent meta-analysis by Roorda et al. (2021) identified 28 studies involving 7849 children from preschool to upper elementary. In the subsample of 14 longitudinal studies, it was demonstrated that dependency negatively predicted later student engagement, achievement, and prosocial behavior and positively predicted internalizing and externalizing behavior. For internalizing behavior, the effects of dependency were larger in the higher grades. Most of the studies reported in this meta-analysis did not control for initial levels of the outcome variables. The few that did also found evidence for dependency as a negative relationship dimension. For instance, a study in elementary school, controlling for initial victimization, sex, and teacher-student closeness and conflict, found that higher dependency increased the risk of both physical and

relational victimization later on (Troop-Gordon & Kopp, 2011). Zee et al. (2013), controlling for a number of child characteristics, found that dependency negatively predicted students' future motivational beliefs. Although more longitudinal research is needed, the existing evidence regarding the detrimental effects of dependency suggests that teachers maintain their role as a secure base for elementary school students (cf. supra, Verschueren, 2015). Of note, all these studies, including those involved in the meta-analysis, were conducted in countries with a rather individualistic orientation. Scholars have suggested that dependency may have a different, more positive meaning in collectivistic cultures, especially for young children (e.g., Gregoriadis & Grammatikopoulos, 2014; Gregoriadis et al., 2021), but longitudinal research is lacking to our knowledge.

All single studies presented so far have longitudinal designs. Experimental studies regarding the role of teacher-student relationship quality are scarce. A few studies found positive effects of interventions aimed at improving the relationship of teachers with at-risk preschoolers on students' externalizing behaviors (e.g., Vancraeyveldt et al., 2015; Williford et al., 2017) and on their behavioral engagement and achievement (Van Craeyevelt et al., 2017). Recently, Duong et al. (2019) found that a brief teacher training aimed at promoting positive relationships with their students in middle school resulted in improvements in the relationship, behavioral engagement, and decreases in disruptive behavior. Yet, no studies in elementary school are known to us. Similarly, to the best of our knowledge, main effects of teacher-student relationship quality in elementary school have not been investigated in genetically informed studies. One study with monozygotic twins investigated the effects of social experiences in kindergarten and found that within-pair differences in teacher-child relationship quality predicted differences in academic achievement in first grade (Vitaro et al., 2012).

Teacher-student relationships have been investigated not only as main effects but also as moderators. According to the academic risk hypothesis, the social environment of the classroom, i.e., the teacher-student relationship quality, will particularly affect vulnerable students, as they have the most to gain or to lose (Hamre & Pianta, 2001; Roorda et al., 2011). As mentioned earlier, teacher-student closeness has been shown to protect students at risk for developing academic or socioemotional difficulties, thereby suggesting that teachers maintain their role as a safe haven for at-risk children. More specifically, longitudinal studies have demonstrated that a close and supportive relationship with the teacher can play a protective role for students' socioemotional and academic adjustment in case of risk for school difficulties caused by internalizing or externalizing behavioral problems, academic problems, negative caregiving experiences, or demographic risks such as minority status and low maternal education. In addition, there is evidence that high conflict and high dependency may exacerbate the negative effects of student risks on academic and socioemotional outcomes (for an overview, including studies in elementary school, see Sabol & Pianta, 2012). In an experimental study, Vandenbroucke et al. (2018) demonstrated the protective role of a supportive teacher-student relationship for students' working memory, an executive function important in learning. For students reporting a negative relationship with their parents, a supportive message from their

teacher resulted in better working memory performance in an induced social stress situation; this effect of teacher support was not found for students with positive parent-child relationships exposed to the same stress. In addition, the only genetically informed, i.e., twin, study regarding this topic revealed that a positive teacher-student relationship buffered the genetically mediated expression of aggression among grade 1 children (Brendgen et al., 2011).

Regarding the role of age, it has been demonstrated that teacher-student relationship quality decreases throughout elementary school. For instance, Collins et al. (2017) found that teacher-student closeness decreased and conflict increased from grade 1 to grade 6. The studies presented above, however, do not provide clear evidence that the relationship would be less influential for late than for early elementary students. In their 2011 meta-analysis, including both cross-sectional and longitudinal studies, Roorda and colleagues even found stronger links between teacher-student relationship quality and academic engagement and achievement for older than for younger students. As for gender, it has been found that teachers, in general, report higher-quality relationships with girls than with boys (McGrath & van Bergen, 2015, for an overview). This may be explained by, among others, girls' higher attunement to teachers' behavioral expectations and girls' higher openness to teachers and/or to a gender "match," as most teachers are female as well (McGrath & van Bergen, 2015; Spilt et al., 2012b). Scholars have argued that lower-quality relationships put boys as a group at higher academic risk and may partly explain boys' lower average engagement and achievement and higher disruptive behaviors (McGrath & van Bergen, 2015; Roorda et al., 2014). Moreover, a few studies demonstrated that teachers also have a differential impact on both genders, but findings are not consistent. In Roorda et al.'s (2011) meta-analysis, both positive and negative teacher-student relationships were linked more strongly to boys' engagement, whereas positive relationships showed stronger correlations with girls' achievement. Baker (2006) found that girls benefited more than boys from teacher-child closeness in terms of socioemotional outcomes. A similar result was found in a study in kindergarten, which at the same time showed a stronger negative effect of conflict on the behavior of boys, as compared to girls (Hamre & Pianta, 2001).

A number of mechanisms have been proposed to account for teacher-student relationship effects on student outcomes (e.g., Verschueren, 2015; Verschueren & Koomen, 2012), but empirical studies that tested for them are limited. First, referring to attachment theory, it has been suggested that positive and negative relationships promote and undermine, respectively, children's stress regulation, which may, in turn, affect their academic and behavioral adjustment. This mechanism may partly explain less conclusive effects of teacher-student relationship quality in elementary compared to preschool, i.e., younger children are more dependent on their caregivers because their stress regulation capacities are less developed (Verschueren & Koomen, 2012). Of note, Ahnert et al. (2012) did find evidence for the effects of teacher-student relationship quality on first grade students' stress regulation, as expressed by their cortisol levels. Second, referring to attachment theory, Doumen et al. (2011) hypothesized that children who have positive relationships with their caregivers, such as their teachers, may consider themselves as more worthy, whereas

negative relationships may give children the message that they are less valuable. Indeed, it was demonstrated that higher teacher-student conflict in first grade predicted later student self-esteem which, in turn, affected their behavioral development. Further, Roorda et al. (2017) demonstrated in their meta-analysis that the effects of positive and negative teacher-student relationships on academic achievement were partially mediated by academic engagement in primary as well as secondary school. This may be explained by motivational theories, i.e., students may become more engaged for school when their basic needs for belonging, competence, and structure are fulfilled through positive relationships with their teachers and, in turn, perform better (e.g., Deci & Ryan, 2000). Another explanation may be provided by attachment theory: When students have positive relationships with their teachers, the resulting emotional security may facilitate their engagement in class, which in turn promotes their achievement (Roorda et al., 2017).

In sum, there is meta-analytic evidence for the longitudinal effects of both positive and negative teacher-student relationships on academic engagement and achievement in elementary school. Less longitudinal studies have been conducted regarding the role of these relationships in students' socioemotional development, and findings are somewhat mixed. However, several studies provide evidence for negative effects of conflict and dependency and for positive effects of supportive and close relationships on student behavioral adjustment, in particular for at-risk children. These findings support the assumption that teachers maintain their role as attachment figures in elementary school, i.e., their role as a secure base and a safe haven, the latter mainly for at-risk children. Future research may try to replicate these findings, unravel inconsistent findings, investigate the effects of teacher-student relationships on more positive socioemotional outcomes (such as self-esteem and prosocial behavior), control for student effects on the relationship whenever possible, use more experimental and genetically informed designs, and further investigate *how* teacher-student relationships shape student development in elementary school.

Teacher-Child Interactions at the Group Level

Teachers do not only relate to individual students, but they also interact with their class as a group. According to the Teaching through Interactions framework (Hamre et al., 2014; Hamre et al., 2013), these classroom interactions are an important vehicle for learning. In their study based on this framework in pre- and elementary school, Hamre et al. (2013) identified and empirically validated three distinct domains of class-level interactions, i.e., emotional support, instructional support, and classroom organization and management. *Emotional support* refers to the promotion of students' socioemotional adjustment through warm and sensitive interactions with the class group and is related to the dimension of closeness and support in the previous section. *Instructional support* concerns the use of interactive strategies to provide students with high-quality learning opportunities, such as

scaffolding and linking new information to their existing knowledge base. Finally, *classroom organization and management* refers to the way in which the classroom is arranged and organized in order to facilitate appropriate student behavior and learning (Hamre et al., 2013). Like for dyadic teacher-student interactions, most research regarding class-level interactions has been conducted in preschool. However, there is longitudinal evidence for the effects of classroom-level teacher-student interactions on academic and socioemotional development in elementary school as well. Regarding academic adjustment, for instance, Vernon-Feagans and colleagues (2019) demonstrated that children who experienced better instructional and emotional support and classroom organization from kindergarten throughout third grade had higher third grade literacy scores, even when controlling for child and family background variables and teachers' specific literacy instruction. Pianta et al. (2008) found that emotional and instructional support quality predicted both reading and math achievement trajectories from preschool to fifth grade. In addition, a cross-lagged study by Pakarinen et al. (2014) showed that lower teacher emotional support toward the class group in first grade predicted higher levels of avoidance behaviors in academically challenging situations in second grade, which is consistent with attachment theory and self-determination theory. Finally, regarding externalizing outcomes, a study in fifth and sixth grade revealed that lower teacher emotional support in fall predicted higher levels of student disruptive behavior in spring of the same school year (Shin & Ryan, 2017).

The importance of classroom-level teacher-student interactions has been demonstrated in intervention studies as well. A meta-analysis of randomized and non-randomized studies by Korpershoek et al. (2016) revealed positive effects of interventions aimed at promoting one or more of the abovementioned dimensions (i.e., emotional support, instructional support, classroom management) on elementary students' academic, behavioral, and socioemotional (but not motivational) outcomes. In particular, the dimension of classroom organization and management has been the focus of many interventions. Often, these interventions are at least partly based on learning theory (e.g., Cowan & Sheridan, 2009) and aim at strengthening teachers' skills to shape the antecedents (e.g., proactively stating clear rules and installing routines) and consequences (e.g., reinforcement) of students' behavior, in order to promote desirable and reduce disruptive behaviors. Randomized controlled trials with behavioral interventions have yielded consistent evidence for the effectiveness of this approach. A meta-analysis identified 19 randomized controlled trial (RCT) studies which tested the effects of a behavioral classroom-based intervention, either in itself or as part of a larger intervention (Veenman et al., 2018). Overall, these interventions reduced teacher-rated disruptive (i.e., hyperactive and oppositional) behavior and increased observed on-task behavior. In addition, single RCTs have found beneficial effects of the Good Behavior Game, a classroom behavior management program for teachers, on students' internalizing problems as well (e.g., Kellam et al., 2008; Van Lier et al., 2005). When finding positive effects in RCTs, researchers usually presume that these effects are driven by the theoretical mechanisms underlying the intervention, in this case teacher's classroom management, and do not further investigate these mechanisms (McKinnon, 1994; Saarento et al.,

2015). In an effort to fill this gap, an RCT investigated whether the effects of the Good Behavior Game indeed were mediated by improvements in teachers' classroom management skills (Leflot et al., 2010; Spilt et al., 2016). It was demonstrated that, compared to control teachers, Good Behavior Game teachers' compliments increased and their reprimands decreased and that these changes in teacher behavior mediated the effect of the intervention on students' disruptive and on-task behaviors.

Similar to dyadic interactions and in line with a moderation perspective, teacher-student interactions at the group level seem to matter most for students at risk (Rucinski et al., 2018). For instance, Hamre and Pianta (2005) found that in emotionally and instructionally supportive classrooms, high-risk (based on demographic characteristics and individual vulnerabilities) students' achievement scores and quality of the relationship with their teacher were similar to low-risk students, whereas high-risk students in low supportive classrooms had lower achievement and more conflict with their teacher than low-risk students. Emotional support at the classroom level was also found to buffer the risk of later internalizing problems in elementary students (Griggs et al., 2016). In addition, randomized controlled trials with interventions promoting teachers' classroom management, such as the Good Behavior Game, found larger effects on student behavior for children with high levels of disruptive behavior or other risks at baseline (e.g., Flower et al., 2014; Leflot et al., 2013). However, this was not found consistently. In their meta-analysis, Veenman et al. (2018) did not find moderation by severity of initial problem behavior. Positive effects of behavioral interventions on students' adjustment were not dependent on students' gender or age either.

Based on theory and research, a number of explanatory mechanisms of teachers' interactions with their class group can be put forward. First, findings by Veenman et al. (2018) and Leflot et al. (2010) support learning theory, i.e., that teachers can shape their students' learning and social behaviors by proactively installing clear rules and routines (antecedents) and by reinforcing desirable behaviors (consequences). Second, according to social learning theory (Bandura, 1977), students learn from the observation of the behavior of others and from the consequences of these behaviors. Hence, teachers can be considered as role models for their students. When teachers interact friendly and supportively with their students, they model appropriate relational skills and increase the likelihood that children will behave nicely and be supportive. Coercive or even hostile teacher-student interactions model negative relational patterns and may, thereby, provoke or enhance power-assertive student behavior (e.g., Serdiouk et al., 2015). In line with this theorizing, Weyns et al. (2017) showed that teachers' observed praise and reprimands at the beginning of second grade predicted the development of students' relational aggression from second to fourth grade: Whereas relational aggression generally increased during that period, it increased at a slower or a faster rate when teachers displayed, respectively, more praise or more reprimands (Weyns et al., 2017). In addition, like for dyadic teacher-student relationships, attachment theory and motivational theories may provide explanatory frameworks. In line with the first, Ahnert et al. (2012) demonstrated that, besides dyadic interactions, classroom-level teacher-student interactions predicted students' cortisol profiles: Compared to high-supportive

classrooms, students in low-supportive classrooms displayed flatter cortisol profiles, suggesting they were less able to downsize their stress. This finding further supports the idea that teachers affect (young) students' adjustment by influencing their stress regulation capacities. Studies based on self-determination theory often focus on adolescence and have demonstrated that teacher-student interactions at the classroom level impact student development through motivational processes. For instance, it has been found that psychologically controlling teaching predicted lower academic and socioemotional adjustment and this effect was mediated by need frustration (e.g., Filippello et al., 2019). Taken together, these findings suggest that teacher-student interactions at the classroom level remain important when children grow older; yet the relative importance of certain types of interactions and of the underlying mechanisms may change, i.e., shift from supporting students' self-regulation to promoting student motivation through autonomy supporting interactions.

In sum, longitudinal research has found effects of both dyadic and classroom-level teacher-student interactions on students' academic and socioemotional development. But to which extent do both types of interactions have distinct effects on students? Longitudinal research including both dyadic and classroom-level teacher-student interactions in the prediction of student outcomes is limited but emergent. A few studies in preschool have found that dyadic and class-level interactions uniquely contribute to subsequent student adjustment (e.g., Cadima et al., 2016; Weyns et al., 2019). A study in grades 3–5 found that dyadic teacher-student relationship quality, but not group-level interactions, predicted changes in student internalizing and externalizing behavior (Rucinski et al., 2018). According to the authors, the nonsignificant contribution of the group-level variable may be due to the low number of classrooms in their sample, so further research is needed to uncover this issue. In addition, a number of studies have investigated the interplay between dyadic and classroom teacher-student interactions in their link with student outcomes, but the findings are not conclusive (Rucinski et al., 2018). For instance, Rucinski et al. (2018) found that teachers' emotional support toward the class group mitigated the link between teacher-student conflict and increases in students' aggression. More specifically, the effect of conflict on aggression was lower in highly supportive classrooms, compared to low-supportive classrooms. This is consistent with studies in preschool demonstrating a protective role of classroom-level interactions for students with low-quality dyadic interactions with their teacher (e.g., Buyse et al., 2008). However, in Rucinski's study, class-level teacher support did not moderate other links between dyadic interaction quality and student outcomes. Neither did a study by Hughes et al. (2006) in first grade find evidence for such moderation. To conclude, until future research clarifies the unique and joint effects of dyadic and group-level teacher-student interactions on children's development, it seems premature to assume that teachers' interactions with their class group can mitigate or compensate for low-quality dyadic relationships (Rucinski et al., 2018). Hence, within the current state of the art, it is important to train pre- and in-service elementary school teachers not only to manage their classrooms and interact supportively

with the class group but also to build high-quality dyadic relationship with their students, in particular their students at risk.

Interplay Between Peer and Teacher Experiences

As could be seen in the previous sections, several studies examined the additive or interactive role of different types of peer or teacher experiences while controlling for other types of experiences. This should become standard procedure given the overlap between different types of peer or teacher experiences. However, few studies examined the possible interplay among the peer and/or teacher experiences over time, but there are some exceptions. To illustrate, van Lier and Koot (2010) found that peer rejection and peer victimization, but not friendship participation, are transactionally (i.e., bidirectionally) related from kindergarten to grade 4. These authors also found that peer rejection and peer victimization link kindergarten externalizing problems with fourth grade internalizing problems, similarly for boys and girls. However, only peer rejection, not victimization nor friendship participation, contributed to the development of externalizing problems. In another study, van Lier and his colleagues investigated the role of peer rejection and best friend's externalizing behavior in the development of externalizing behavior in children followed from kindergarten to grade 3 (Sturaro et al., 2011). Using a cross-lagged design, these authors found that peer rejection, but not best friend's externalizing problems, consistently positively predicted externalizing problems above and beyond prior levels of problem behavior. All findings were similar for boys and girls. These results concur with findings from Vitaro and his colleagues (2007) who also found that peer rejection, not friends' externalizing problems, played an important role during early childhood with respect to the linkage between early disruptive behaviors and later violent delinquency and substance use. However, friends' externalizing problems by late childhood played a necessary, albeit partial, mediating role in the process linking early disruptiveness and later violent delinquency, but not in the process linking early disruptiveness and later substance use (Vitaro et al., 2007). These results underline the dynamic role each peer experience can play with development. They also show the importance, if not the necessity, of considering different types of peer experiences (and different outcomes) in the same study.

Experiences with peers and experiences with teachers are also interconnected, although it is not clear whether this is because teachers and peers react in a similar way to children's characteristics or because they influence each other (Howes et al., 1994). In support with the latter view, White and her colleagues experimentally manipulated teachers' behavior and showed that verbal comments expressed publicly by the teacher toward a particular child influenced classmates' perception of the child, independent of the child's actual behavior (White & Jones, 2000; White et al., 1996). Accordingly, longitudinal research demonstrated that teacher behavior toward students predicted peer perceptions of teachers' disliking 3 months later and this, in turn, predicted peers' disliking of those students 6 months later (Hendrickx

et al., 2017). Going one step further, Sette and her colleagues showed that teachers' liking of students predicted peer inclusion which, in turn, accounted for the link between teachers' liking and changes in academic achievement from grade 5 to grade 6 (Sette et al., 2020). The influence between the teacher and the peer group may, however, be reciprocal. For example, Mercer and DeRosier (2008) found that peer rejection and teacher preference (i.e., how much a teacher likes a child) reciprocally predict each other over four data points spanning from fall of grade 3 to spring of grade 4. This result was obtained despite controlling for concurrent children's aggression. Other studies also found transactional links between peer relationships (peer liking or peer-perceived popularity) and teacher-child relationships (i.e., support and conflict) throughout childhood, net of children's behavioral characteristics (De Laet et al., 2014; Hughes & Chen, 2011). Taken together, these findings suggest that not only peers' but also teachers' liking or disliking of a student is influenced by their perception of how much that student is liked by others and thus act as social referents for each other. However, reciprocal links have not always been found. In some studies with children aged between 8 and 12 years old, peer acceptance predicted changes in teacher support, but teacher support did not predict changes in peer acceptance (Leflot et al., 2011; Weyns et al., 2018). Yet, in another study involving kindergarten children, peer rejection did not predict teacher preference (Taylor, 1989). Finally, in a recent study involving upper elementary school children, Demol et al. (2020) found no cross-lagged links between teacher support and peer rejection during the course of one school year when taking into account other peer experiences such as peer victimization. Interestingly, however, these authors found bidirectional (negative) longitudinal links between teacher support and peer victimization during the first part of the school year and a unilateral (negative) longitudinal link between teacher support and peer victimization during the second part, net of peer rejection. The only possible conclusion at this point is that further research regarding the dynamic interplay between different types of peer experiences and different dimensions of the teacher-child relationship is needed.

The above studies assessed the interplay between peer experiences and teacher experiences during childhood. Some also tested for the contribution of each type of social experience while controlling their overlap with the other type, as well as their overlap with children's characteristics who often precede these social experiences. However, the studies that simultaneously and repeatedly examined the contribution of peer and teacher experiences to children's behavior or school-related outcomes using a cross-lagged design spanning over two or more data points are scarce. Moreover, their findings do not always concord. For example, Mercer and DeRosier (2008) found that aggression remained relatively unaffected by either peer rejection or teacher preference during late childhood. In contrast, Leflot et al. (2011) found that peer preference, but not teacher support, contributed to changes in externalizing problems during the middle childhood period. In turn, Weyns et al. (2019) found that interactions with the teacher, both at the individual and at the classroom level, contributed to changes in internalizing and externalizing problems in kindergarteners, but peer preference did not. On the other hand, it seems that both peer rejection and teacher-child relationship quality are important when the outcome is academic performance in young children, even after accounting for genetic effects (Vitaro

et al., 2012). In accordance with this last comment, De Laet et al. (2015), as well as Weyns et al. (2018) found additive and unique effects of teacher-student relationships and peer status (likeability and popularity) on school engagement in early and late elementary school children. Together, these results underline the possibility that experiences with peers and experiences with teachers might play different, albeit complementary, roles depending on the nature of the outcome (i.e., socioemotional, behavioral, or academic) or on children's age. This, however, remains largely speculative at the moment.

Conclusions and Future Directions

There are a number of points that can be derived from the present chapter: First, we need to consider several peer and teacher experiences simultaneously to control for their overlap and asses their unique role, but also to examine their possible interplay over time and their possible interactive (vs additive) contributions to children' development. Second, we need to consider different outcomes over several data points, possibly within the same school year, as the role of different social experiences may differ depending on the type of outcome considered and children's developmental status or degree of acquaintance with peers or teacher. Third, we need to examine possible behavioral, cognitive, affective, neuro-physiological, or epigenetic mechanisms that can account for different types of social experiences during the elementary school years as well as different factors biological, behavioral, cognitive or social that might mitigate or aggravate their contribution. Finally, we need to consider teacher and peer experiences as potential moderators of the link between children's characteristics and different outcomes, although they may not (always) produce main effects (see, e.g., Vitaro et al., 2018, in reference to aggression).

In parallel to our efforts to integrate different social experiences, we need to consider strong methodologies, including more experimental studies. These experimental studies may take the form of intervention/prevention efforts to improve experiences with peers and experiences with the teacher with the goal of increasing children's social behavior, well-being, and academic performance or engagement (e.g., Pahigiannis & Glos, 2020; Vancraeyveldt et al., 2015). In turn, intervention/prevention studies can help pinpoint the causal role of these social experiences.

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